2.1 Basics of Radicals

Please work on the Unit 2 Pretest for the next 25 minutes.

2.1 Basics of Radicals

4/14/14

Define and identify square roots and principal square roots.

Perfect Squares

$3 \cdot 3 = 9$ $\quad -3 \cdot -3 = 9$ $\quad 9 \cdot 9 = 81$

$2 \cdot 2 = 4$ $\quad -3 \cdot 3 = \not{9}$ $\quad -9 \cdot -9 = 81$

Principal Square Root

$\sqrt{9} = 3, -3, |3|$

$\sqrt{196} = 14, -14, |14|$

IWBAT simplify radical expressions and identify equivalent expressions and simplify products or quotients of radical expressions. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

2.1 Basics of Radicals

4/14/14

Simplify

If a and b are factors of c, then $\sqrt{c} = \sqrt{a * b}$.

Also, $\sqrt{a * b} = \sqrt{a} * \sqrt{b}$.

5 9
3 15 $\sqrt{45} = \sqrt{5 \cdot 9} = \sqrt{3 \cdot 15} = \sqrt{3} \cdot \sqrt{15} = \sqrt{5} \cdot \sqrt{9}$

$= 3\sqrt{5}$

2 66
4 33 $\sqrt{132} = \sqrt{4} \cdot \sqrt{33} = 2\sqrt{33}$

6 22 $\sqrt{2 \cdot 66} = \sqrt{6 \cdot 22}$

11 12 $\sqrt{4 \cdot 33} = \sqrt{11 \cdot 12}$

IWBAT simplify radical expressions and identify equivalent expressions and simplify products or quotients of radical expressions.

Simplify

Recall $\sqrt{c} = \sqrt{a * b} = \sqrt{a} * \sqrt{b}.$

$\sqrt{3} * \sqrt{12} = \sqrt{3 \cdot 12} = \sqrt{36} = 6$

$\sqrt{2} * \sqrt{3} * \sqrt{6} = \sqrt{36} = 6$

IWBAT simplify radical expressions and identify equivalent expressions and simplify products or quotients of radical expressions.

2.1 Basics of Radicals

4/14/14

Give equivalent forms.

$\sqrt{3} * \sqrt{15} = \sqrt{45} = \sqrt{5 \cdot 9} = 3\sqrt{5}$

$\sqrt{3 \cdot 3 \cdot 5} = 3\sqrt{5}$

$\sqrt{90} = \sqrt{9 \cdot 10} = 3\sqrt{10}$

3 30
5 18
9 10

$3 \cdot 3 \, 10$

245

IWBAT simplify radical expressions and identify equivalent expressions and simplify products or quotients of radical expressions.

2.1 Basics of Radicals

4/14/14

Equivalent Forms

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

$$\frac{\sqrt{4x^2}}{\sqrt{2x}} = \sqrt{\frac{4x^2}{2x}} = \sqrt{\frac{2x}{1}} = \sqrt{2x}$$

$$\frac{\sqrt{8x^3}}{\sqrt{2x}} = \sqrt{\frac{8x^3}{2x}} = \sqrt{4x^2} = 2x$$

IWBAT simplify radical expressions and identify equivalent expressions and simplify products or quotients of radical expressions.

Vocabulary 2.1.1 p. 17

Practice 2.1.2

Apex quizzes 2.1.3 & 2.1.4

IWBAT simplify radical expressions and identify equivalent expressions and simplify products or quotients of radical expressions.

2.2 Multiplying & Dividing Radicals

4/15/14

Identify Equivalent radical expressions.

$\sqrt{60}$

8

$2\sqrt{15}$

$\sqrt{3} * 2\sqrt{12}$

$\sqrt{4} * \sqrt{15}$

$\sqrt{64}$

$2^2\sqrt{3^2}$

$\sqrt{4 * 16}$

$\sqrt{3 * 48}$

2.2 Multiplying & Dividing Radicals

4/15/14

Identify the inequality that represents the values of x for which a radical expression is defined.

$\sqrt{3x}$ $x \geq 0$ domain

$\frac{1}{\sqrt{5x}}$ $x > 0$ more restrictive / more positive

$\sqrt{3x} \div \sqrt{5x}$ $x > 0$

2.2 Multiplying & Dividing Radicals

4/15/14

Identify the inequality that represents the values of x for which a radical expression is defined.

$\sqrt{x+2}$ $x \geq -2$

$\dfrac{\sqrt{x-1}}{\sqrt{2x-4}}$ $x \geq 1$ $x > 2$ $x > 2$

$\sqrt{x+3} \div \sqrt{x^2-9}$ $x > 3$

$x \geq -3$ $x > -3$ $x > 3$

2.2 Multiplying & Dividing Radicals 4/15/14

IWBAT multiply and divide radical expressions that contain variables, and choose equivalent expressions and use the FOIL method to multiply radical expressions that involve two terms. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

2.2 Multiplying & Dividing Radicals

4/15/14

Recall $\sqrt{c} = \sqrt{a * b} = \sqrt{a} * \sqrt{b}.$

$\sqrt{3x} * \sqrt{5} =$ $\sqrt{3x \cdot 5} = \sqrt{15x}$

$\sqrt{3x} * \sqrt{3} =$ $\sqrt{9x} = 3\sqrt{x}$

$2\sqrt{2x} * 3\sqrt{2x} =$ $6\sqrt{4x^2} = 6 \cdot 2x = 12x$

IWBAT multiply and divide radical expressions that contain variables, and choose equivalent expressions and use the FOIL method to multiply radical expressions that involve two terms.

2.2 Multiplying & Dividing Radicals

4/15/14

$\sqrt{2x} * \sqrt{x+3}$ $\sqrt{2x^2+6x}$ radicand

$\sqrt{x-3} * \sqrt{x+3}$ $\sqrt{x^2-9}$

$\sqrt{x-5} * \sqrt{x+8}$ $\sqrt{x^2+8x-5x-40}$

$\sqrt{x^2+3x-40}$

IWBAT multiply and divide radical expressions that contain variables, and choose equivalent expressions and use the FOIL method to multiply radical expressions that involve two terms.

2.2 Multiplying & Dividing Radicals

4/15/14

Recall $\dfrac{\sqrt{a}}{\sqrt{b}} = \sqrt{\dfrac{a}{b}}$

$\dfrac{\sqrt{4x}}{\sqrt{2x}} = \sqrt{\dfrac{4x}{2x}} = \sqrt{\dfrac{2 \cdot 1}{1 \cdot 1}} = \sqrt{2}$

$\dfrac{x \times 2}{2}$ $\dfrac{\sqrt{6x^3}}{\sqrt{2x}} = \sqrt{\dfrac{6x^3}{2x}} = \sqrt{\dfrac{3x^2}{1 \cdot 1}} = \sqrt{3x^2} = x\sqrt{3}$

$\sqrt{3x^2} \div \sqrt{9x^5} = \sqrt{\dfrac{3x^2}{9x^5}} = \sqrt{\dfrac{1 \cdot 1}{3x^3}} \div \dfrac{1}{x} \dfrac{1}{\sqrt{3x}} = \dfrac{1}{x\sqrt{3x}}$

IWBAT multiply and divide radical expressions that contain variables, and choose equivalent expressions and use the FOIL method to multiply radical expressions that involve two terms.

2.2 Multiplying & Dividing Radicals

4/15/14

$$\frac{\sqrt{6x-4}}{\sqrt{2x}} = \sqrt{\frac{6x-4}{2x}} = \sqrt{\frac{3x-2}{x}}$$

$$\frac{\sqrt{3x+6}}{\sqrt{2x+4}} = \sqrt{\frac{3x+6}{2x+4}} = \sqrt{\frac{3(x+2)}{2(x+2)}} = \sqrt{\frac{3}{2}}$$

$$\sqrt{x-3} \div \sqrt{x^2-9} = \sqrt{\frac{x-3}{x^2-9}} = \sqrt{\frac{x-3}{(x-3)(x+3)}}$$

$$\frac{1}{\sqrt{x+3}}$$

IWBAT multiply and divide radical expressions that contain variables, and choose equivalent expressions and use the FOIL method to multiply radical expressions that involve two terms.

2.2 Multiplying & Dividing Radicals 4/15/14

Vocabulary 2.2.1 p. 15

Practice 2.2.2

Apex quizzes 2.2.3 & 2.2.4

IWBAT multiply and divide radical expressions that contain variables, and choose equivalent expressions and use the FOIL method to multiply radical expressions that involve two terms.

2.3 Adding & Subtracting Radicals

4/16/14

Identify the inequality that represents the values of x for which a radical expression is defined.

$\sqrt{x-4} \div \sqrt{x^2}$

$x \geq 4$ $x > 0$

$x \geq 4$

$2x+1=0$

$-1 \quad -1$

$\frac{2x}{2} = \frac{-1}{2}$

$\sqrt{2x+1} \div \sqrt{x+1}$

$x \geq -\frac{1}{2}$ $x > -1$

$x \geq -\frac{1}{2}$

$\sqrt{x^2+1} \div \sqrt{x^2-4}$

$x \geq 0$ $x > 2$

$x > 2$

2.3 Adding & Subtracting Radicals

4/16/14

Define "like terms" as the phrase applies to radical expressions.

$$2\sqrt{3} - 3\sqrt{2} + 3\sqrt{2} - 5\sqrt{3}$$

$$2\sqrt{3} + \sqrt{48} - 2\sqrt{5}$$

$4\sqrt{3}$

$48 = 9 \cdot 4 \cdot 3$

$\sqrt{48} = 4\sqrt{3}$

IWBAT simplify two or more radical expressions so that they have the same radicand and add and subtract radical expressions and identify equivalent expressions. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

$$2\sqrt{3} - 3\sqrt{2} + 3\sqrt{2} - 5\sqrt{3}$$

$-3\sqrt{3} + 0\sqrt{2}$

$-3\sqrt{3}$

$$2\sqrt{3} + \sqrt{48} - 2\sqrt{5}$$

$+4\sqrt{3}$

$6\sqrt{3} - 2\sqrt{5}$

IWBAT simplify two or more radical expressions so that they have the same radicand and add and subtract radical expressions and identify equivalent expressions.

2.3 Adding & Subtracting Radicals

4/16/14

$$\sqrt{75(x+2)} + \sqrt{3(x+2)}$$

$5\sqrt{3(x+2)}$

$6\sqrt{3(x+2)}$

$$\sqrt{20x^3} - \sqrt{45x^3}$$

$5\ 4 \qquad 9\ 5$

$2\sqrt{5x^3} - 3\sqrt{5x^3}$

$-1\sqrt{5x^3}$

$-x\sqrt{5x}$

IWBAT simplify two or more radical expressions so that they have the same radicand and add and subtract radical expressions and identify equivalent expressions.

2.3 Adding & Subtracting Radicals

4/16/14

$1\sqrt{x^3} + 5\sqrt{x^3} - 2x\sqrt{x}$

$6\sqrt{x^3} - 2x\sqrt{x}$

$6x\sqrt{x} - 2x\sqrt{x}$

$4x\sqrt{x}$

$2\sqrt{x+2} - \sqrt{4x+8} + \sqrt{9x-18}$

$2\sqrt{x+2} - \sqrt{4(x+2)} + \sqrt{9(x-2)}$

$2\sqrt{x+2} - 2\sqrt{x+2} + 3\sqrt{x-2}$

$3\sqrt{x-2}$

IWBAT simplify two or more radical expressions so that they have the same radicand and add and subtract radical expressions and identify equivalent expressions.

2.3 Adding & Subtracting Radicals 4/16/14

Vocabulary 2.3.1 p. 8

Practice 2.3.2

Apex quiz 2.3.3

IWBAT simplify two or more radical expressions so that they have the same radicand and add and subtract radical expressions and identify equivalent expressions.

2.4 Rationalizing Denominators

4/18/14

Add and subtract radical expressions.

$$2\sqrt{3} + x\sqrt{3} - 3\sqrt{3}$$

$-1\sqrt{3} + x\sqrt{3} = (x-1)\sqrt{3}$

$$2\sqrt{3} + x\sqrt{3x} + 2x\sqrt{3x}$$

$2\sqrt{3} + 3x\sqrt{3x}$

$$2\sqrt{3} - \sqrt{12} + \sqrt{75}$$

$3(4)3 \quad 3\,25$

$2\sqrt{3} - 2\sqrt{3} + 5\sqrt{3}$

$5\sqrt{3}$

2.4 Rationalizing Denominators

4/18/14

Find the conjugate of an expression.

$3 + \sqrt{3}$ $\quad 3 - \sqrt{3}$

$\sqrt{x} - \sqrt{x-1}$ $\quad \sqrt{x} + \sqrt{x-1}$

$\sqrt{3x} + 5$ $\quad \sqrt{3x} - 5$

2.4 Rationalizing Denominators 4/18/14

IWBAT rationalize the denominator of a fraction when the denominator contains one term, identify the fraction needed to rationalize a given fraction that contains one term in the denominator, and rationalize the denominator of a fraction when the denominator contains two terms. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

2.4 Rationalizing Denominators

4/18/14

$$\frac{5}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{5\sqrt{6}}{\sqrt{36}} = \frac{5\sqrt{6}}{6}$$

$$\sqrt{6}^2$$

$$\frac{\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{6}}{\sqrt{2^2}} = \frac{\sqrt{6}}{2}$$

$$\frac{7}{\sqrt{2x}} \cdot \frac{\sqrt{2x}}{\sqrt{2x}} = \frac{7\sqrt{2x}}{2x}$$

IWBAT rationalize the denominator of a fraction when the denominator contains one term, identify the fraction needed to rationalize a given fraction that contains one term in the denominator, and rationalize the denominator of a fraction when the denominator contains two terms.

2.4 Rationalizing Denominators

4/18/14

$$\frac{5}{x+\sqrt{6}} \cdot \frac{x-\sqrt{6}}{x-\sqrt{6}} = \frac{5(x-\sqrt{6})}{x^2-6}$$

$$\frac{\sqrt{3}}{\sqrt{2}-x} \cdot \frac{\sqrt{2}+x}{\sqrt{2}+x} = \frac{\sqrt{6}+x\sqrt{3}}{2-x^2}$$

$$\frac{7x}{x-\sqrt{2x}} \cdot \frac{x+\sqrt{2x}}{x+\sqrt{2x}} = \frac{7x(x+\sqrt{2x})}{x-2x} = \frac{7\cancel{x}(x+\sqrt{2x})}{-\cancel{x}} = -7(x+\sqrt{2x})$$

IWBAT rationalize the denominator of a fraction when the denominator contains one term, identify the fraction needed to rationalize a given fraction that contains one term in the denominator, and rationalize the denominator of a fraction when the denominator contains two terms.

2.4 Rationalizing Denominators

4/18/14

$$\frac{5}{\sqrt{x+2}-\sqrt{x}} \cdot \frac{\sqrt{x+2}+\sqrt{x}}{\sqrt{x+2}+\sqrt{x}} = \frac{5(\sqrt{x+2}+\sqrt{x})}{x+2-x} = \frac{5(\sqrt{x+2}+\sqrt{x})}{2}$$

$$\frac{7}{\sqrt{2x}-\sqrt{x-1}} \cdot \frac{\sqrt{2x}+\sqrt{x-1}}{\sqrt{2x}+\sqrt{x-1}} = \frac{7(\sqrt{2x}+\sqrt{x-1})}{2x-(x-1)} = \frac{}{x+1}$$

$$\frac{\sqrt{3x}}{\sqrt{2x}-\sqrt{x-1}} = \frac{\sqrt{3x}(\sqrt{2x}+\sqrt{x-1})}{2x-(x-1)} = \frac{x\sqrt{6}+\sqrt{3x^2-3x}}{x+1}$$

IWBAT rationalize the denominator of a fraction when the denominator contains one term, identify the fraction needed to rationalize a given fraction that contains one term in the denominator, and rationalize the denominator of a fraction when the denominator contains two terms.

2.4 Rationalizing Denominators

4/18/14

Vocabulary 2.4.1 p. 12

Practice 2.4.2

Apex quiz 2.4.3

IWBAT rationalize the denominator of a fraction when the denominator contains one term, identify the fraction needed to rationalize a given fraction that contains one term in the denominator, and rationalize the denominator of a fraction when the denominator contains two terms.

2.5 Solving Radical Equations

4/21/14

Find the conjugate of an expression.

$\sqrt{3x}+6$ $\sqrt{3x}-6$

$\sqrt{x}-\sqrt{x-2}$ $\sqrt{x}+\sqrt{x-2}$

$\sqrt{2x+4}-\sqrt{2x}$ $\sqrt{2x+4}+\sqrt{2x}$

Rationalize the denominator of a fraction when the denominator contains two terms.

$$\frac{5}{\sqrt{3x}+6}\cdot\frac{\sqrt{3x}-6}{\sqrt{3x}-6}=\frac{5(\sqrt{3x}-6)}{3x-36}$$

$$\frac{\sqrt{x}}{\sqrt{x}-\sqrt{x-2}}\cdot\frac{\sqrt{x}+\sqrt{x-2}}{\sqrt{x}+\sqrt{x-2}}=\frac{x+\sqrt{x^2-2x}}{x-(x-2)}=\frac{x+\sqrt{x(x-2)}}{2}$$

2.5 Solving Radical Equations 4/21/14

IWBAT solve a radical equation by isolating the radical and squaring both sides of the equation to eliminate radicals. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

2.5 Solving Radical Equations

4/21/14

$\sqrt{x} = 9$ (square both sides)

$x = 81$

$\sqrt{2x} = 8$ (square both sides)

$\frac{2x}{2} = \frac{64}{2}$

$x = 32$

$\sqrt{x+1} = 6$ (square both sides)

$x + 1 = 36$

$-1 \quad -1$

$x = 35$

IWBAT solve a radical equation by isolating the radical and squaring both sides of the equation to eliminate radicals.

2.5 Solving Radical Equations

4/21/14

$$2+\sqrt{2x-5}=7$$

$-2 \quad -2$

$$\left(\sqrt{2x-5}\right)^2=5^2$$

$$2x-5=25$$

$+5 \quad +5$

$$\frac{2x}{2}=\frac{30}{2}$$

$$x=15$$

$$\left(\sqrt{x}\right)^2=(x-2)^2 \quad (x-2)$$

$$x=x^2-4x+4$$

$-x \quad -x$

$$0=x^2-5x+4$$

$$(x-4)(x-1)$$

$x=4, 1$ ✓ ✓ (1) extraneous root

$\sqrt{4}=4-2$

$2=2$

$\sqrt{1}=1-2$

$1\neq -1$

IWBAT solve a radical equation by isolating the radical and squaring both sides of the equation to eliminate radicals.

2.5 Solving Radical Equations

4/21/14

The formula relating skid mark distance to a vehicle's speed is: $S = \sqrt{30Df}$

where S is speed in miles per hour (mph), D is the skid distance in feet, and f is the drag factor . The car skidded 97 feet before imacting another vehicle and coming to a stop. If the claimed speed is 35mph, what is D?

$f = 0.75$

$35^2 = \left(\sqrt{30D(0.75)}\right)^2$

$\frac{1225}{22.5} = \frac{22.5D}{22.5}$

$D = 54.44$ ft

IWBAT solve a radical equation by isolating the radical and squaring both sides of the equation to eliminate radicals.

If D = 54.44 ft, and the car skidded 97 ft before imapct, the total distance the car would have skidded is 97 + 54.44 = 151.44 ft. Given this new D, how fast was the car travelling when the driver applied the brakes?

$$S = \sqrt{30(151.44)(0.75)}$$

$$S = \sqrt{22.5(151.44)}$$

$$S = 58.4 \text{ mph}$$

IWBAT solve a radical equation by isolating the radical and squaring both sides of the equation to eliminate radicals.

2.5 Solving Radical Equations

4/21/14

Vocabulary 2.5.1 p. 13

Practice 2.5.2

Apex quiz 2.5.3

IWBAT solve a radical equation by isolating the radical and squaring both sides of the equation to eliminate radicals.

2.6 Rational Exponents

4/22/14

Define and identify a rational exponent.

$$\sqrt[n]{x} = x^{\frac{1}{n}}$$

n = index of the radical

$\sqrt[5]{x} = x^{\frac{1}{5}}$ $\sqrt[9]{x} = x^{\frac{1}{9}}$ $\sqrt{x} = x^{\frac{1}{2}}$

IWBAT identify the index of a radical, simplify expressions that contain rational exponents, express a given root as a rational exponent, determine whether a radical expression yields a real number, and convert decimal exponent notation to fractional exponent notation. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

2.6 Rational Exponents

4/22/14

$$\sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m = \left(a^{\frac{1}{n}}\right)^m = \left(a^m\right)^{\frac{1}{n}} = a^{\frac{m}{n}}$$

$\sqrt[5]{x^3} = \left(\sqrt[5]{x}\right)^3$ $\sqrt[6]{x^4} = x^{\frac{4}{6}}$ $\sqrt[25]{x^7} = \left(x^{\frac{1}{25}}\right)^7$

$\left(\sqrt[7]{x}\right)^3 = \left(x^{\frac{1}{7}}\right)^3$ $\left(\sqrt[5]{x}\right)^6 = \left(x^6\right)^{\frac{1}{5}}$ $\left(\sqrt{x}\right)^9 = x^{\frac{9}{2}}$

IWBAT identify the index of a radical, simplify expressions that contain rational exponents, express a given root as a rational exponent, determine whether a radical expression yields a real number, and convert decimal exponent notation to fractional exponent notation.

Is this root a real number?

Real

$\sqrt[7]{-2}$

$(-1)^{\frac{1}{3}}$

odd index

Imaginary

$\sqrt[12]{-81}$

$(-9)^{\frac{1}{4}}$

even index

IWBAT identify the index of a radical, simplify expressions that contain rational exponents, express a given root as a rational exponent, determine whether a radical expression yields a real number, and convert decimal exponent notation to fractional exponent notation.

2.6 Rational Exponents

4/22/14

Converting decimal to fractional exponents

$$2^{4.83} = 2^{4} + 2^{\frac{8}{10}} + 2^{\frac{3}{100}}$$

$$8^{3.91} = 8^{3} + 8^{\frac{9}{10}} + 8^{\frac{1}{100}}$$

$$12^{63.25} = 12^{63} + 12^{\frac{2}{10}} + 12^{\frac{5}{100}}$$

$$3^{5} + 3^{\frac{7}{10}} + 3^{\frac{2}{100}} = 3^{5.72}$$

IWBAT identify the index of a radical, simplify expressions that contain rational exponents, express a given root as a rational exponent, determine whether a radical expression yields a real number, and convert decimal exponent notation to fractional exponent notation.

2.6 Rational Exponents

4/22/14

Converting decimal to fractional exponents

Vocabulary 2.6.1 p. 14

Practice 2.6.2

Apex quizzes 2.6.3 & 2.6.4

IWBAT identify the index of a radical, simplify expressions that contain rational exponents, express a given root as a rational exponent, determine whether a radical expression yields a real number, and convert decimal exponent notation to fractional exponent notation.

Simplify expressions that contain rational exponents.

$$\left(36^{\frac{1}{2}}\right)^2$$

$$\left(8^4\right)^{\frac{1}{3}}$$

$$216^{\frac{2}{3}}$$

Define the set of complex numbers.

Recall $\sqrt{-1} = i$ is an imaginary number, and that

$$\sqrt{-36} = \sqrt{-1 * 36} = \sqrt{36} * \sqrt{-1} = 6i$$

therefore $6i$ is an imaginary number.

Find: $\sqrt{-49}$ $\sqrt{-169}$

2.7 Complex Numbers

4/25/14

Define the set of complex numbers.

Complex numbers have a REAL and an IMAGINARY part.

$$7+6i \qquad -3-2i \qquad 23-12i$$

$$\frac{28+5i}{13} \qquad \frac{15}{17}-\frac{12}{17}i \qquad -8+i$$

This is written generally as a + bi.

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

Adding complex numbers.

$$(4 + 6i) + (3 + 2i) = 7 + 8i$$

$$(4 + 3) + (6i + 2i) = 7 + 8i$$

$$(4 + 6i) - (3 + 2i) = 1 + 4i$$

$$(4 - 3) + (6i - 2i) = 1 + 4i$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

$$(4-6i)+(12+2i)=$$

$$(1+i)-(11-3i)=$$

$$(-2+2i)+(9-5i)=$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Multiplying complex numbers

Treat the pairs of complex numbers as any binomial and use the FOIL method.

$$(4+3i)*(2+6i)=8+24i+6i+18i^2$$

Recall that $i=\sqrt{-1}$ therefore $i^2=\sqrt{-1}^2=-1$

$$8+24i+6i+18i^2=8+24i+6i+18(-1)$$

Combine like terms.

$$(8-18)+(24i+6i)=-10+30i$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

$$(5+2i)(3-2i) =$$

$$(-2+6i)(4+7i) =$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Recall that the conjugate of a + b is a - b.

$$e.g.\ \sqrt{x+2}-6 \rightarrow \sqrt{x+2}+6$$

So the conjugate of a complex number a+bi is a-bi.
The pair together are called *complex conjugates*.

Find the conjugate:

$3-2i$

$6+2i$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Dividing complex numbers by multiplying by the complex conjugate of the denominator.

$$\frac{3+2i}{4-i} * \frac{4+i}{4+i} = \frac{12+3i+8i+2i^2}{4^2-i^2} = \frac{10+11i}{17} = \frac{10}{17} + \frac{11}{17}i$$

$$\frac{2-6i}{3-5i} * \frac{3+5i}{3+5i} = \frac{6+10i-18i-30i^2}{3^2-5^2i^2} = \frac{36-8i}{9-25(-1)} = \frac{36-8i}{34} =$$

$$\frac{36}{34} - \frac{8}{34}i = \frac{18}{17} - \frac{4}{17}i$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

$$\frac{2+7i}{3-2i}$$

$$\frac{6-i}{6+2i}$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Vocabulary 2.7.1 p. 17

Practice 2.7.2

Apex quizzes 2.7.3 & 2.7.4

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Define the set of complex numbers.

Recall $\sqrt{-1} = i$ is an imaginary number, and that

$$\sqrt{-36} = \sqrt{-1 * 36} = \sqrt{36} * \sqrt{-1} = 6i$$

therefore $6i$ is an imaginary number.

Find: $\sqrt{-49}$ $\sqrt{-169}$

$7i$ $13i$

Adding complex numbers.

$$(4 + 6i) + (3 + 2i) = 7 + 8i$$

$$(4 + 3) + (6i + 2i) = 7 + 8i$$

$$(4 + 6i) - (3 + 2i) = 1 + 4i$$

$$(4 - 3) + (6i - 2i) = 1 + 4i$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Add these complex numbers.

$(4 + 5i) + (3 - 2i)$

$(4+3) + (5i - 2i) = 7 + 3i$

$(12 - 3i) - (3 - 4i)$

$(12-3) + (-3i - -4i) = 9 + 1i = 9+i$

$-3i + 4i$

$(2 - 5i) - (7 + 3i)$

$(2-7) + (-5i - 3i) = -5 + -8i = -5 - 8i$

Recall that the conjugate of a + b is a - b.

e.g. $\sqrt{x+2} - 6 \rightarrow \sqrt{x+2} + 6$

So the conjugate of a complex number a+b*i* is a-b*i*.
The pair together are called *complex conjugates*.

Find the conjugate:

$3 - 2i$ $3 + 2i$

$6 + 2i$ $6 - 2i$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Multiplying complex numbers

Treat the pairs of complex numbers as any binomial and use the FOIL method.

$$(4+3i)*(2+6i) = 8+24i+6i+18i^2$$

Recall that $i = \sqrt{-1}$ therefore $i^2 = \sqrt{-1}^2 = -1$

$$8+24i+6i+18i^2 = 8+24i+6i+18(-1)$$

Combine like terms. $-10+30i$

$$(8-18)+(24i+6i) = -10+30i$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

$(5+2i)(3-2i) =$ $15-10i+6i-4i^2$

$+4$

$19-4i$

$(-2+6i)(4+7i) =$

$-8-14i+24i+42i^2$

-42

$-50+10i$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

2.7 Complex Numbers

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Dividing complex numbers by multiplying by the complex conjugate of the denominator.

Real imaginary

$$\frac{3+2i}{4-i} * \frac{4+i}{4+i} = \frac{12+3i+8i+2i^2}{4^2-i^2} = \frac{10+11i}{17} = \frac{10}{17} + \frac{11}{17}i$$

$$\frac{2-6i}{3-5i} * \frac{3+5i}{3+5i} = \frac{6+10i-18i-30i^2}{3^2-5^2i^2} = \frac{36-8i}{9-25(-1)} = \frac{36-8i}{34} =$$

$$\frac{36}{34} - \frac{8}{34}i = \frac{18}{17} - \frac{4}{17}i$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

2.7 Complex Numbers

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$$\frac{2+7i}{3-2i}\cdot\frac{3+2i}{3+2i}=\frac{6+4i+21i+14i^2}{9-4i^2}=\frac{6+25i+14i^2}{9-4i^2}$$

$$\frac{-8+25i}{13}=-\frac{8}{13}+\frac{25}{13}i$$

$$\frac{6-i}{6+2i}\cdot\frac{6-2i}{6-2i}=\frac{36-12i-6i+2i^2}{36-4i^2}=\frac{34-18i}{40}$$

$$\frac{34}{40}-\frac{18}{40}i=\frac{17}{20}-\frac{9}{20}i$$

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

Vocabulary 2.7.1 p. 17

Practice 2.7.2

Apex quizzes 2.7.3 & 2.7.4

IWBAT find the sum or difference of complex numbers, rewrite the square root of a negative number as an imaginary number, find the product or quotient of complex numbers, identify the complex conjugate of a complex number, and find the product of a real number and complex number by using the distributive property.

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Unit 2 Test (2.8.2)